

Balancing Equations and Types of Chemical Reactions

Balancing equations:

If 1 Cl looks like this: \bigcirc draw the molecules symbolized here:



How many atoms are in the following compounds

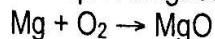
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|------------------------------|-------|------|------|
| a) NaOH | Na= 1 | O= 1 | H= 1 |
| b) $\text{Ca}(\text{OH})_2$ | Ca= 1 | O= 2 | H= 2 |
| c) $3\text{Ca}(\text{OH})_2$ | Ca= 3 | O= 6 | H= 6 |

The LAW of conservation of Matter (mass) states that matter can neither be created or destroyed

Atoms are neither created or destroyed, only rearranged in a chemical reaction

The number of a particular atom is the same on both sides of a chemical equation

Example: Magnesium + Oxygen

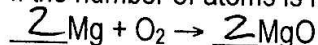


How many atoms are on each side:

Left: Mg = 1 O = 2

Right: Mg = 1 O = 1

If the number of atoms is not the same on both sides, we must balance the equation.



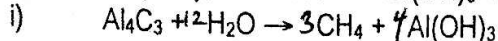
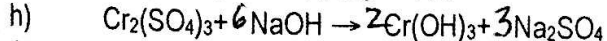
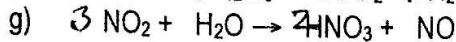
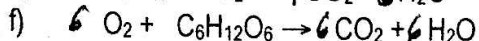
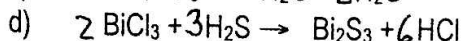
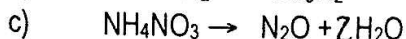
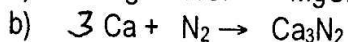
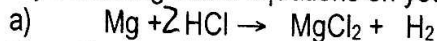
Now we have a balanced equation! The matter on the left is equal to the matter on the right.

Left: Mg = 2 O = 2

Right: Mg = 2 O = 2

Cleverly, the matter on the left hand side of the reaction is called the REACTANTS and the right hand side of the equation is called the PRODUCTS

Try balancing these equations on your own:



Types of reactions

A SYNTHESIS RXN is when two or more simple compounds combine to form a more complicated one.

The general form for this type of equation is $A + B \rightarrow AB$

EXAMPLE $Na + Cl \rightarrow NaCl$

A DECOMPOSITION RXN is the opposite of a synthesis reaction - a complex molecule breaks down to make simpler ones.

The general form for this type of equation is $AB \rightarrow A + B$

EXAMPLE $2Li_2O \rightarrow 4Li + O_2$

A SINGLE REPLACEMENT RXN is when one element trades places with another element in a compound.

The general form for this type of equation is $AB + C \rightarrow AC + B$

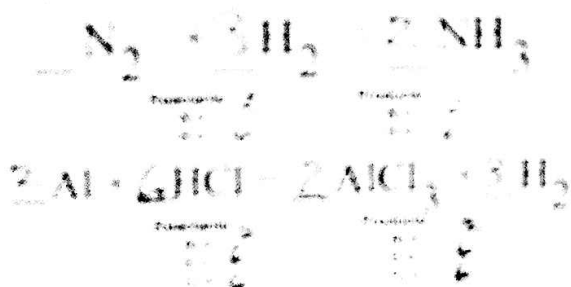
EXAMPLE $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

A DOUBLE REPLACEMENT RXN is when the anions and cations of two different molecules switch places, forming two entirely different compounds.

The general form for this type of equation is $AB + CD \rightarrow AD + CB$

EXAMPLE $2NaCl + MgS \rightarrow Na_2S + MgCl_2$

Write and balance the following chemical reactions:



NaOH + H ₂ SO ₄ → Na ₂ SO ₄ + H ₂ O	DEP
Type of reaction	Double Replacement
Ca(OH) ₂ + H ₂ SO ₄ → CaSO ₄ + H ₂ O	ACID/BASE
Type of reaction	Double Replacement
Mg + FeSO ₄ → MgSO ₄ + Fe	MR
Type of reaction	Single Replacement
Fe + CuSO ₄ → FeSO ₄ + Cu	MR
Type of reaction	Single Replacement
2H ₂ + O ₂ → 2H ₂ O	SYNTHESIS
Type of reaction	Synthesis
2H ₂ O ₂ → 2H ₂ O + O ₂	DECOMPOSITION
Type of reaction	Decomposition